

CRUMB REMOVAL SYSTEM

This is a continuation of application Ser. No. 07/600,880, filed Oct. 22, 1990 now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to apparatus for separating smaller particles and fines from larger particles in a particle stream being discharged from the end of a conveyor, for example for separating crumbs from tortilla chips, corn chips or potato chips being fed to a weighing and packaging apparatus.

2. Description of the Prior Art

Generally fines and crumbs produced by breakage during processing and handling of fragile salty snack food chips, such as tortilla chips, corn chips and potato chips, remain within the product stream and are bagged along with the unbroken pieces. Removing the crumbs and fines reduces the quantity of bagged product produced per unit weight of raw input.

However, crumbs or fines are generally undesirable in bagged particulate food snacks since they cannot be readily picked up by fingers. Often the crumbs or fines are thrown away where the quality of the snack food presented to guests or customers is important. A fragile snack food product with reduced crumb content is desirable.

Conventional screening or sieve apparatus can be employed to separate crumbs and fines from unbroken chips. However such equipment is generally quite expensive and subject to clogging by the irregular shaped broken pieces of the snack food pieces. Such prior art equipment will tend to slow down the production lines either by low throughput or down time to clear the screens and thus increase the inefficiency of the production line.

An object of the invention is to construct an efficient and inexpensive apparatus for separating smaller particles from larger particles in a particle stream being discharged from a conveyor.

SUMMARY OF THE INVENTION

The invention is summarized in an apparatus for separating smaller particles from larger particles in a particle stream being discharged from an end of a conveyor wherein an inclined chute extends underneath the conveyor with an upper end of the chute disposed in front of the discharge end of the conveyor. The upper end of the chute is horizontally spaced from the discharge end of the conveyor by a distance forming an opening between the upper end of the chute and the discharge end of the conveyor. This opening has a width selected to permit the smaller particles to fall onto the chute and to prevent passage of the larger particles.

The present invention is particularly advantageous for providing a simple inexpensive apparatus for separating small particles and fines from larger particles while avoiding problems of clogging.

Other objects, advantages and features of the invention will be apparent from the following description of the preferred embodiment taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatical side elevational view of a particulate food snack feeding station broken away

from a bagging apparatus including a crumb removal system in accordance with the invention.

FIG. 2 is an enlarged elevation view, partially in section, of a broken away portion of the crumb removal system of FIG. 1.

FIG. 3 is a top plan view of the broken away portion of the system of FIG. 2.

FIG. 4 is an elevation view of a broken away portion of a modified crumb removal system in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, one embodiment of the invention includes an inclined chute indicated generally at 10 extending beneath a pan or trough 12 of a conventional vibratory feeder indicated generally at 14 which is used to feed particulate food snack product such as tortilla chips, corn chips, potato chips, or the like to a conventional statistical weighing machine indicated generally at 16. The chute 10 is mounted by a frame or bracket 18 above the weigher 16. The chute 10 has an upper end 20 disposed in front of the discharge end 22 of the conveyor trough 12 so as to form an opening 24 through which crumbs and fines fall into the chute 10 and are thus separated from the stream of particles being fed by the vibratory feed trough 12 to the bagging apparatus 16.

Alternatively the vibratory conveyor can be replaced by any other conveyor mechanism which is suitable for conveying particulate materials, such as food snack chips. Preferably the conveyor mechanism includes a facilities, for example, vibrating surface, traveling belt, etc., which moves relative to the chute so as to assist in avoiding clogging of the opening between the end of the conveyor and the chute with crumbs or broken particles.

In another variation shown in FIG. 4, the chute is mounted by a suitable bracket 80 on the vibratory feeder so as to vibrate the upper end 20 out of phase with the feeder end 22. By this manner the chute 10 will also be vibrated to facilitate movement of the smaller particles down the chute and reduce the buildup of seasoning and other fine particulate material at the impact point on the chute. The mounting of the chute in FIG. 4 is isolated from the weigher 16 to avoid vibration induced weighing errors.

Fragile food snacks such as tortilla chips, corn chips, potato chips, and the like, suffer some breakage during processing and handling to produce crumbs or small broken pieces 30, FIGS. 2 and 3, which are mixed with larger and unbroken pieces 32. Additionally, fines such as seasoning particles are included in the stream being discharged from the vibratory feeder trough 12. Aided by the vibration of the product stream, the crumbs and fines generally gravitate to the bottom of the vibratory trough 12 where they can readily fall through the opening 24 and down the chute 10 under the force of gravity to a crumb receptacle 36, FIG. 1. The larger pieces and unbroken chips 32 are pushed over the upper end 20 of the chute 10 to fall into the weighing mechanism of the bag making and filling apparatus 16.

The conveyor trough 12 has a horizontal bottom wall 40 and a pair of opposite side walls 42 and 44 forming a channel for guiding a stream of the snack chips out the open end 22. In a conventional packaging apparatus the stream of snack chips, including the fines, crumbs, larger pieces and unbroken chips, fall directly from the